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ABSTRACT

This paper summarizes the efforts of the Department of Health, Education and Welfare (DHEW) to provide women with the opportunity and encouragement to excel through education. Data are given about employment patterns of women in science and engineering. Traditional barriers thought to restrict participation of women in science and engineering are identified. (SL)

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The Future For Women in Science and Engineering

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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By

Virginia Y. Trotter
Assistant Secretary for Education
Department of Health, Education and Welfare

I am honored to be participating -- in absentia -- in this symposium. The occasion of our Nation's Bicentennial and the second year of the decade dedicated by the United Nations to the betterment of women -- and thereby the world -- provides an unique forum for both a retrospective and a prospective view of the progress of women. I believe that, on balance, we have every reason to view both our recent progress and our potential for new success with pride.

I regret that my Congressional testimony prevents me from hearing the opening remarks of this distinguished panel and from participating in subsequent discussions. I am grateful, however, for the opportunity to contribute my perspectives molded from my career in university education and administration and from my experiences as the Assistant Secretary for Education.

The speakers you have heard today have discussed the historical and present-day roles of women and their involvement in science. As we look toward the future which women and science necessarily share,

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To be delivered on behalf of Dr. Virginia Y. Trotter at the symposium "Bicentennial Retrospectives and Prospectives: Science Education for Women" being held in conjunction with the annual meeting of the American Association for the Advancement of Science, Boston, Massachusetts, February 23, 1976.

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let me first describe my perceptions of the world of the future. Then I will briefly describe those educational trends which I perceive as impacting on that future, and finally I will propose a course which I trust will prepare us as active participants and co-equals in that future.

We must begin by recognizing that the only constant in our world's environment today is change -- a rapid and accelerating rate of change. In the past decade alone we have witnessed a staggering leap in our basic body of knowledge and a similar if not more extraordinary increase in the technologies which serve us. While there is no magic crystal ball with which we can predict the future, we can confidently assume that changes will continue at the undiminished pace we have been experiencing.

As women and co-equals in that future, we must all be aware that the rapid changes which have become a hallmark of our era touch every aspect of our lives -- social, economic, psychological and moral.

We have seen changes in our social environment in such areas as increased participation by minorities -- racial and sexual -- in the governance of our world and in an acknowledgement that every human is entitled to an adequate and improved quality of life.

Dramatic changes in our economic environment are reflected at the national level in the fluctuating Cost of Living Index. These changes are experienced at the personal level by a reduction in the purchasing

power of our dollars. Positive products of the changes in our psychological and moral environment are reflected in our belief in the increased value and dignity of human life -- and in our active and concerted efforts to improve our physical environment.

The Changes we have experienced are most postively and materially expressed in our achievements in science and technology -- and in their applications which enhance our day-to-day lives. These technological achievements have placed our country in an envied and emulated position of world leadership. We have the technology base which provides us with basic science as well as inventive applications for these sciences to support our industries. It is imperative, therefore, to provide educational, monetary and moral support not only to this base, but also to the women who by participation can double this base if we are to continue to progress and maintain a position of world leadership.

We have in our nation what has been called "the technological initiative" -- that fragile and intangible attribute which has, to this point in our history, insured that though we share our knowledge and our products with other countries, we maintain a competitive lead in these areas of our expertise. The American "technological initiative" is premised on the strength and competitive nature of the free will of the American public. It is the American people -- men and women -- who provide the momentum to achieve these lofty technical heights. It is the American people -- men and women -- who are the most precious

natural resource of our country.

I believe that the best assurance that women will be intimately involved in the preservation and acceleration of our technological initiative is education. Our U.S. education system is unique both in its role and in its ability to respond to societal needs. As you know, the Federal role in American education is to establish broad national educational policy and goals which will assure equity and equal opportunities for all our citizens. To accomplish these goals, we sponsor broad research and innovative projects. We provide technical and financial assistance to individuals and institutions to address national problems which affect the whole of our society. The concerns which the Federal government addresses are those transcending the responsibility and/or capacity of the State and local governments.

Our educational tradition has been one of responding to changing needs and expectations of our society. We have responded by changing the focus of our educational efforts as our nation moved from an agrarian to an industrialized power. We responded to the challenge of Sputnik; we have begun responding to the needs of racial minorities. Now we must broaden our field of view to include women.

I believe the Federal government -- and particularly the Education Division which I head -- is taking significant steps to provide women opportunity and encouragement to excell through education in any area of their endeavor, be it in the traditonal women's roles or in a career

position traditionally dominated by men. Our efforts and involvements begin with the teaching of children to be parents; they continue into the early childhood education programs and are continuous through our lifelong adult education programs. The success of our educational endeavors obviously will not be manifested in this year or next year's graduates. Our efforts -- while aimed at all age levels, races and sexes -- will be producing results over the next number of years and the upcoming generations. But our discussion today relates to the progress of women in a very particular area: science and engineering. So let me bring into focus some diverse facts gleaned from research, seminars, etc. about women in science and engineering which have impacted on the shaping of our national directions in education.

- women are numerically underrepresented in the fields of science and engineering (a 1973 survey of doctoral scientists and engineers conducted by the National Academy of Sciences shows only 9 percent were women)

- women tend to be better represented in the social sciences rather than the physical and life sciences

- patterns differ among the subfields of these larger disciplinary areas (e.g., within the physical sciences there are more women astronomers than physicists)

- traditonal barriers most commonly thought to restrict participation of women in science and engineering have been grouped under three headings:

    -- psychological predispositions of women (there is a greater inclination among women to pursue socially oriented occupations while men pursue investigative or analytical work)

    -- social pressures and norms (expectations of parents and teachers lead them to see and encourage sex-appropriate behaviors in boys and girls)

    -- structural characteristics of scientific and engineering professions (specifically: 1) the tendency of male scientists

to seek out other males as their proteges; 2) the emphasis on full-time, uninterrupted involvement may act to deter large numbers of women from scientific and engineering fields and 3) the peripheral status of the women who do in fact enter these professions)

The Education Division of the Department of Health, Education and Welfare has a strong commitment to provide equal opportunities for all citizens of our country. Similarly, we believe that our prime role is that of a change agent and as such our efforts and involvements must help to assure the continuing socialization of our citizens. The agenda of tomorrow's education will necessarily focus on quality, equity and access. The question becomes: How will we accomplish this?

It would be a simple matter to reach this goal were it not for the fact that American education serves a democratic society. Educating would be easy if -- at the Federal or State level -- we could dictate values and program content and, by the massive infusion of dollars, arrive at a product educated on rigid, pre-defined lines.

But we cannot -- fortunately -- dictate that a certain number of women or men will be scientists or philosophers or clerks. So our efforts must be to educate the American public to the broad range of occupational or career paths that are open to them equally, with their potential for success independent of societal pressures and dependent only on their free will to succeed. We are committed to eradicating psychological and legal barriers to educational or career choices.

I've briefly mentioned the gamut of the Education Division's efforts; let me give you a few specific examples. The Office of Education, the largest component within the Education Division, supports well over one hundred separate programs. These programs include efforts in early childhood education -- the preparation of children for formal schooling. Familiar programs on the elementary and secondary level include bilingual education, Right to Read and Follow Through. We support American Indian education programs. We provide funds to States and for individual, nationally competed projects under the Emergency School Aid Act. We provide grant assistance in the development of programs to benefit the handicapped. We support occupational, vocational and adult education programs.

In the postsecondary field our Fiscal Year 1977 budget will provide assistance to approximately 2.4 million students enrolled in colleges, universities and other postsecondary institutions across the country. We believe no student should be denied access to a postsecondary education because of financial barriers. We support loan programs, grant programs, work-study programs and certain direct fellowships. We also provide financial assistance to developing institutions.

I would be remiss if I failed to mention the efforts of the Women's Program Staff in the Office of Education. Two major thrusts of this staff are related to:

-- sex equality in education. Three handbooks will be developed and distributed in the subject areas of Sex Equality in Educational Materials, Sex Equality in Schools, and Sex Equality in Education Administration.

-- sex equality in guidance opportunities. With a grant from the Women's Program, the American Personnel and Guidance Association is developing a training project to assist elementary and secondary school counselors to recognize and change sex-biased guidance practices and attitudes. If women continue to be counseled away from certain careers of educational opportunities at the elementary and secondary level, this affects the educational and professional choices they make throughout their lives.

The National Institute of Education, the research arm of the Office of the Assistant Secretary for Education, is supporting several programs which bear on today's discussion. One is a study of women as graduate students to determine if there is discrimination against women as graduate students and, if so, how it is manifested. A second study looks at sex bias in tests.

The National Center for Education Statistics, also a part of the Office of the Assistant Secretary for Education, is proceeding with a review of sex discrimination in educational institutions, as mandated by the Women's Educational Equity Act of 1974. Three component studies will be conducted under contract to NCES, including:

-- employment practices. A review and analysis of employment practices relating to teaching, supervisory, administrative and other professional personnel in educational institutions -- public, parochial and private.

-- guidance and counseling. A review and analysis of the availability of appropriate guidance and counseling services for students in secondary, postsecondary and adult education

-- access to education. A review and analysis of access to various types of programs in postsecondary education, including occupational, technical and professional education, higher education and adult education.

My immediate office is currently planning a national conference on women to be held this spring. It will involve distinguished members of the education community convening for a working conference on the most critical issues facing women in education. These areas tentatively have been identified as:

-- women in educational leadership
-- teacher/counselor education and instruction materials
-- education and work
-- women's studies
-- changing male roles
-- Title IX

Our objective is to understand the processes by which inequality occurs and to develop prevention and intervention strategies for reducing and eventually eliminating this inequality that undermines both individuals and the entire fabric of our society. Our efforts are obviously but a part of a larger social concern.

We in the Education Division -- and certainly all Federal agencies -- have no mandate to direct the composition of our future society. Instead we are tasked with removal of any and all barriers which prevent any citizen from achieving his or her full potential. I believe our overall Education Division program, while sharing financial limitations with all Federal programs, is well-designed to serve this function.

You asked for my thoughts on the future for women -- and their future in science and engineering. I believe the combined education program is working on all levels for the benefit of women. This will naturally accrue to all professions -- including science and engineering.

Realistically, however, there is a time lag between interesting young women in science and engineering and their receipt of a doctoral degree and entering the work field. The National Science Foundation is supporting several projects which are testing the premise that it is not too late even at the post-high school level to reverse the process through which so many women are steered away from rather than towards the sciences and engineering. This is a valuable undertaking. Another possibility would be the "retread"of those women who previously earned degrees. Our lifelong learning programs are an important beginning and must run in tandem with revised social attitudes. Science knows no nationality and shoud recognize no distinction of sex, color or creed among those who are contributing to its advancement.

We at the Federal level have set our objective to assure equality, equity and access for all out nation's citizens. You as members of the education and scientific communities must serve as role models for our nation's youth. You must provide guidance, assurance and encouragement as women develop interests in science and engineering. You must work on a personal basis to remove the professional biases which discourage participation by women.

In our zealous efforts on behalf of women and science, we dare not become a scientific Tower of Babel. The price of failure is too dear. We will be judged in the future on how well we acquit ourselves in discharging our unavoidable responsibilities to women, to science and to society. This is a heavy burden, but one warranting our finest efforts.

Thank you.

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